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EXAMINER	
BENGHUZZI, MOHSIN M	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/761,605	BALAKRISHNAN ET AL.	
	Examiner	Art Unit	
	Mohsin (Ben) Benghuzzi	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-24,29-32 and 35-43* is/are rejected.

7)☒ Claim(s) *7,25-28,33 and 34* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-6, 8-24, 29-32, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richards et al. (US Pub 2002/0075972) in view of Gossett et al. (US Pub 2004/0095990).

1) Regarding claim 1:

Richards et al. teach a method for sampling a signal comprising:

matching the signal to a first receive pulse shape (Paragraph 0193 and block 1008 in figures 10 and 11A, wherein, matching, as claimed, is interpreted according to the drawings of the instant disclosure at blocks 615, 617 of figure 7);

matching the signal to a second receive pulse shape (Paragraph 0194 and block 1026 in figures 10 and 11A, wherein, matching, as claimed, is interpreted according to the drawings of the instant disclosure at blocks 615, 617 of figure 7);

creating an output signal from the sampled outputs (739 in Fig. 6 and paragraph 0169, lines 14-18).

Richards et al. do not specifically teach sampling outputs from the first and second matching, however, Gossett et al. teach sampling a matched output signal (109

in Fig. 1 and paragraph 0026, wherein, sampling, as claimed, is interpreted according to the drawings of the instant disclosure at blocks 715, 717 of figure 7).

Sampling of a signal that has been matched in a digital communications receiver is essential. It is clearly well known in the art that sampling of the matched output signal allows for the creation of discrete-valued output and, therefore, allows for the analog to digital conversion of the signal, and eventually for the decoding and reproduction of the original transmitted signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method of Richards et al. sampling the outputs from the first and second matching, as Gossett et al. teach, in order to eventually be able to decode the matched signal into the original transmitted signal.

2) Regarding claim 2:

Richards et al. teach, wherein the first and the second receive pulse shapes are essentially equal, and wherein the first receive pulse shape has been advanced a first time offset and the second received pulse shape has been retarded a second time offset (Pulse 1104a in Fig. 11A is advanced and pulse 1112b is retarded).

3) Regarding claim 3:

Richards et al. teach, wherein the first time offset and the second time offset are essentially equal (Pulse 1104a in Fig. 11A is advanced and pulse 1112b is retarded, wherein, it is clearly interpreted that the offset for the two pulses is the same, i.e., 5.0 nsec).

4) Regarding claim 4:

Richards et al. teach, wherein the first and the second time offsets can be determined from characteristics of the signal (paragraph 0171, lines 1-7, wherein, the correlation function is interpreted as the characteristics of the signal).

5) Regarding claim 5:

Richards et al. teach, wherein the first and the second time offsets can be determined adaptively (Paragraph 0176, lines 9-11, wherein, 'based on information modulation' is interpreted to be equivalent to adaptively).

6) Regarding claim 6:

Richards et al. or Gossett et al. do not specifically teach, wherein the sampling occurs at the same time for each output, however, it is clearly obvious to of ordinary skill in the relevant art that in order to perform subsequent processing and calculation to the two output signals and produce correct results, sampling of the two output signals must be synchronized, i.e., must occur at the same time.

7) Regarding claim 8:

Richards et al. teach, wherein the creating comprises adding the sampled outputs together (Paragraph 0215, lines 13-15).

8) Regarding claim 9:

Richards et al. teach, wherein samples from each output are multiplied by a weighting factor prior to the adding (Paragraph 0167, lines 5-7 and paragraph 0171, lines 5-7).

9) Regarding claim 10:

Richards et al. doesn't specifically disclose that the weighting factor of claim 9 is the same for all samples from an output; however, such limitation is merely a matter of design choice and would have been obvious in the system of Richards et al. As Richards et al. disclose (See Paragraph 0167, lines 5-7), selection of the weighing factor is dependent on the signal to noise ratio to be achieved and is design specific.

10)Regarding claim 11:

Richards et al. doesn't specifically disclose that the weighting factor can be different for each output, however, as discussed in claim 10 above, such limitation is merely a matter of design choice.

11)Regarding claim 12:

Gossett et al. teach, wherein the creating comprises combining the outputs in a tapped-delay line fashion (Paragraph 0011, lines 17-21 and paragraph 0044, wherein, the tapped-delay line is interpreted to be a FIR filter as disclosed in the instant specification at paragraph 0054).

12)Regarding claim 13:

Gossett et al. does not specifically disclose the equation as cited in the claim, however, such an equation merely expresses the output of a FIR filter in terms of the inputs, and that expression of the output of the filter is well known in the art of discrete signal processing.

13)Regarding claim 14:

Richards et al. teach a method comprising:

matching a received signal to a first received pulse shape, wherein the first received pulse shape is a representation of a pulse carried in the received signal (Paragraph 0193 and block 1008 in figures 10 and 11A, wherein, matching, as claimed, is interpreted according to the drawings of the instant disclosure at blocks 615, 617 of figure 7);

matching the received signal to a second received pulse shape, wherein the second received pulse shape is a representation of the pulse carried in the received signal (Paragraph 0194 and block 1026 in figures 10 and 11A, wherein, matching, as claimed, is interpreted according to the drawings of the instant disclosure at blocks 615, 617 of figure 7);

combining the samples to create an output signal (739 in Fig. 6, paragraph 0169, lines 14-18, and Paragraph 0215, lines 13-15).

Richards et al. do not specifically teach sampling outputs from the first and second matching, however, as discussed in claim 1 above, Gossett et al. teach sampling a matched output signal (109 in Fig. 1 and paragraph 0026, wherein, sampling, as claimed, is interpreted according to the drawings of the instant disclosure at blocks 715, 717 of figure 7).

14) Regarding claim 15:

Richards et al. teach, wherein the first received pulse shape is advanced by a first time offset and the second received pulse shape is retarded by a second time offset (Pulse 1104a in Fig. 11A is advanced and pulse 1112b is retarded).

15)Regarding claim 16:

Richards et al. teach, wherein the first and the second time offsets are essentially equal (Pulse 1104a in Fig. 11A is advanced and pulse 1112b is retarded, wherein, it is clearly interpreted that the offset for the two pulses is the same, i.e., 5.0 nsec).

16)Regarding claim 17:

Richards et al. teach, wherein the first and the second time offsets can be chosen based upon an auto-correlation function of the pulse (paragraph 0171, lines 1-7, wherein, the 'correlation function' is clearly equivalent the auto-correlation function).

17)Regarding claim 18:

Richards et al. teach, wherein the first and the second time offsets can be chosen adaptively (Paragraph 0176, lines 9-11, wherein, 'based on information modulation' is interpreted to be equivalent to adaptively).

18)Regarding claim 19:

Richards et al. teach, wherein in an additive white Gaussian noise situation, the outputs can be combined by addition (Paragraph 0167, lines 5-7 and paragraph 0215, lines 13-15, wherein, 'optimize signal to noise ratio' is interpreted to include encompassing optimization when white Gaussian noise is present, as such noise is what is referred to when noise is generally referenced).

19)Regarding claim 20:

As discussed in claim 11 above, the limitation that the samples from one output are multiplied by a first weighting factor and the samples from the other output are multiplied by a second weighting factor prior to the addition, i.e., weighting factors are different, is

merely a matter of design choice and would have been obvious in the system of Richards et al.

20)Regarding claim 21:

Gossett et al. teach, wherein in a multipath situation, the outputs can be combined in a tapped-delay line fashion (Paragraph 0011, lines 17-21 and paragraph 0044, wherein, the tapped-delay line is interpreted to be a FIR filter as disclosed in the instant specification at paragraph 0054).

21)Regarding claim 22:

Gossett et al. does not specifically disclose the equation as cited in the claim, however, such an equation merely expresses the output of a FIR filter in terms of the inputs, and that expression of the output of the filter is well known in the art of discrete signal processing.

22)Regarding claim 23:

Gossett et al. teach, wherein the combining further comprises equalizing the samples (Paragraph 0012, lines 1-11, wherein, removing distortion is interpreted to be equivalent to equalizing).

23)Regarding claim 24:

Gossett et al. does not disclose that the equalization is performed using a DFE, a RSSE, a MLSE or combinations thereof, however, such filters are well known in the art, and using one of those filters is advantageous and would be clearly obvious to one of ordinary skill in the art.

24)Regarding claim 29:

Richards et al. disclose a circuit comprising:

a first matched filter coupled to a signal input, the first matched filter containing circuitry to compare a pulse provided by the signal input to a first receive pulse shape (Paragraph 0193 and block 1008 in figures 10 and 11A, wherein, matching, as claimed, is interpreted according to the drawings of the instant disclosure at blocks 615, 617 of figure 7) and to provide an output based upon the comparison (739 in Fig. 6 and paragraph 0169, lines 14-18); and

a second matched filter coupled to the signal input, the second matched filter containing circuitry to compare a pulse provided by the signal input to a second receive pulse shape (Paragraph 0194 and block 1026 in figures 10 and 11A, wherein, matching, as claimed, is interpreted according to the drawings of the instant disclosure at blocks 615, 617 of figure 7) and to provide an output based upon the comparison (739 in Fig. 6 and paragraph 0169, lines 14-18).

Regarding the outputs of the output signals being sampled, as discussed in claim 1 above, Gossett et al. disclose sampling a matched output signal (109 in Fig. 1 and paragraph 0026, wherein, sampling, as claimed, is interpreted according to the drawings of the instant disclosure at blocks 715, 717 of figure 7).

25)Regarding claim 30:

Gossett et al. disclose an equalizer coupled to the first and the second matched filters, the equalizer containing circuitry to combine samples produced by the first and

the second matched filters to produce an output signal (Paragraph 0012, lines 1-11, wherein, removing distortion is interpreted to be equivalent to equalizing).

26)Regarding claim 31:

Richards et al. disclose a circuit, wherein each matched filter comprises:

a multiplier to multiply the pulse with a receive pulse shape (1106 or 1116 in Fig. 11A);

an integrator coupled to the multiplier, the integrator to accumulate a value from an output produced by the multiplier (1108 or 1118 in Fig. 11A).

As discussed in claim 1 above, Gossett et al. disclose a sampler coupled to the integrator, the sampler to periodically create a sample based upon the accumulated value from the integrator (109 in Fig. 1 and paragraph 0026, wherein, sampling, as claimed, is interpreted according to the drawings of the instant disclosure at blocks 715, 717 of figure 7).

27)Regarding claim 32:

Richards et al. disclose, wherein the sampler is a switch that periodically closes to produce a sample (109 in Fig. 1).

28)Regarding claim 35:

Richards et al. disclose a circuit, wherein the first receive pulse shape is an advanced version of the pulse and the second receive pulse shape is a retarded version of the pulse (Pulse 1104a in Fig. 11A is advanced and pulse 1112b is retarded).

3. Claims 36-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richards et al. (US Pub 2002/0075972) and Gossett et al. (US Pub 2004/0095990), and further in view of McCorkle (US 6,937,646).

1) Regarding claim 36:

Richards et al. disclose a receiver comprising:

a first matched filter, the first matched filter containing circuitry to compare a pulse provided by the amplifier to a first receive pulse shape and to provide an output sample based upon the comparison (Paragraph 0193 and block 1008 in figures 10 and 11A, wherein, the match filter, as claimed, is interpreted according to the drawings of the instant disclosure at blocks 615, 617 of figure 7);

a second matched filter, the first matched filter containing circuitry to compare a pulse provided by the amplifier to a second receive pulse shape and to provide an output sample based upon the comparison (Paragraph 0194 and block 1026 in figures 10 and 11A, wherein, the match filter, as claimed, is interpreted according to the drawings of the instant disclosure at blocks 615, 617 of figure 7); and

Richards et al. do not disclose an amplifier coupled to the band select filter, the amplifier to bring an output of the band select filter to a desired level, however, Gossett et al. disclose an amplifier coupled to bring a signal to a desired level (102 in Fig. 1).

It is essential that an input signal to a front-end of a receiver be amplified. It is well known in the relevant art that such amplification is necessary in order for the receiver input signal to be strong enough for the subsequent circuitry to be able to detect it and process it. Therefore, it would have been obvious to one of ordinary skill in

the art at the time the invention was made to include in the receiver of Richards et al. an amplifier coupled to the input, as Gossett et al., in order to be able to subsequently process the input signal correctly.

Gossett et al. further disclose a decoder coupled to the first and the second matched filters, the decoder containing circuitry to detect and eliminate errors that may be present in the outputs produced by the first and the second matched filters (Paragraph 0026, lines 4-6).

Richards et al. or Gossett et al. do not disclose a band select filter coupled to a signal input, the band select filter containing circuitry to selectively pass a portion of a frequency band from a signal provided by the signal input; however, McCorkle discloses a receiver comprising a band select filter (42 in Fig. 9A, wherein, a BPF or band pass filter is interpreted to be equivalent to a band select filter). Having a band select filter at the front-end of a receiver is well known in the relevant art. Such a filter allows only a frequency band of interest to pass into the receiver, and suppresses all other frequencies, including noise. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a band select filter, as McCorkle discloses, in the receiver of Richards et al. and Gossett et al., in order to pass in the receiver only the frequency band of interest.

2) Regarding claim 37:

Richards et al. disclose, wherein the receiver operates in a wireless communications network (Paragraph 0003, lines 1-2).

3) Regarding claim 38:

Richards et al. disclose, wherein the wireless communications network is an ultra-wideband communications network (Paragraphs 0032 and 0033).

4) Regarding claim 39:

Richards et al. does not specifically disclose that the wireless communications network is a carrier-less ultra-wideband communications network, however, it is well know in the art such UWB technology is pulse-based communication technology and is carrier-less.

5) Regarding claim 40:

McCorkle discloses a receiver, wherein the wireless communications network is a wavelet-based ultra-wideband communications network (Abstract, lines 3-5).

6) Regarding claim 41:

Gossett et al. disclose a receiver comprising an equalizer coupled to the first and the second matched filters, the equalizer containing circuitry to combine samples produced by the first and the second matched filters to produce an output signal (Paragraph 0012, lines 1-11, wherein, removing distortion is interpreted to be equivalent to equalizing).

7) Regarding claim 42:

Gossett et al. disclose a receiver comprising a despreader having inputs coupled to the first and second matched filter and an output coupled to the equalizer, the despreader containing circuitry to remove a spreading code that is present in the signal (Paragraph 0026, lines 1-4, wherein, multiplying by the pseudo-random sequence is interpreted as equivalent to despreading).

8) Regarding claim 43:

Gossett et al. disclose a receiver comprising:

a despreader having inputs coupled to the first and second matched filter and an output coupled to the equalizer, the despreader containing circuitry to remove a spreading code that is present in the signal (Paragraph 0026, lines 1-4, wherein, multiplying by the pseudo-random sequence is interpreted as equivalent to despreading); and

an equalizer coupled to the despreader, the equalizer containing circuitry to combine an output produced by the despreaders to produce an output signal (Paragraph 0012, lines 1-11, wherein, removing distortion is interpreted to be equivalent to equalizing).

Allowable Subject Matter

4. Claims 7, 25-28, 33, and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to clearly teach or suggest a method as disclosed in claim 1 wherein the rate for sampling outputs from the first and second matching can be determined from expected characteristics of the signal. The prior art of record further fails to clearly teach or suggest a method as discussed in claim 14 wherein adjusting sample timing is performed after combining the sampled outputs from the first and second matching.

The prior art of record further fails to clearly disclose or suggest a circuit as discussed in claim 29 wherein the period of the sampler switch is based upon a frequency of the pulses provided by the signal input.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Miller et al. (US Pub 2003/0067963) discloses a system and method for controlling the mode of operation in a UWB receiver.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mohsin (Ben) Benghuzzi whose telephone number is (571) 270-1075. The examiner can normally be reached Monday through Friday, 8:30am- 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

7. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Mohsin (Ben) Benghuzzi

April 24, 2007

M. G.
MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER